

**THAT WHICH IS CLAIMED IS:**

1. A process which comprises contacting a sulfamate stabilized, bromine-based breaker with an aqueous polysaccharide fracturing fluid for use in subterranean oil and gas wells, wherein said breaker is present in an amount to reduce the viscosity of said fracturing fluid.

2. A process according to Claim 1 wherein said breaker is formed from bromine chloride, bromine and chlorine, or a mixture of bromine chloride and up to about 50 mole% of bromine.

3. A process according to Claim 1 wherein said breaker is formed from  
(A) a halogen source which is (i) bromine chloride, (ii) bromine and chlorine, (iii) bromine, or (iv) a mixture of any two or more of (i), (ii), and (iii),  
(B) a source of sulfamate anions,  
(C) alkali metal base, and  
(D) water,

in amounts such that the breaker has an active bromine content of at least 50,000 ppm, and an atom ratio of nitrogen to active bromine originating from (A) and (B) that is greater than about 0.93.

4. A process according to Claim 3 wherein said alkali metal base is a sodium or potassium base.

5. A process according to Claim 3 wherein said halogen source is bromine chloride, bromine and chlorine, or a mixture of bromine chloride and bromine, and wherein said alkali metal base is a sodium or potassium base.

6. A process according to Claim 3 wherein said halogen source consists essentially of bromine chloride.

7. A process according to Claim 3 wherein said alkali metal base is a sodium base.

8. A process according to Claim 3 wherein said active bromine content of the breaker is at least 100,000 ppm.

9. A process according to Claim 3 wherein said atom ratio of nitrogen to active bromine originating from (A) and (B) is at least about 1.

10. A process according to Claim 3 wherein the pH of the breaker is at least about 12.

11. A process according to Claim 3 wherein said halogen source consists essentially of bromine chloride; wherein said alkali metal base is a sodium base; wherein said active bromine content of the breaker is at least 100,000 ppm; wherein said atom ratio of nitrogen to active bromine originating from (A) and (B) is at least about 1; and wherein the pH of the breaker is at least about 12.

12. A process according to Claim 3 wherein said halogen source consists essentially of bromine chloride, wherein the alkali metal base is sodium hydroxide, wherein the active bromine content of the breaker is at least 140,000 ppm, the above atom ratio of nitrogen to active bromine originating from (A) and (B) is at least about 1.1, and the pH of the breaker is at least about 13.

13. A process according to Claim 1 wherein said breaker is a solid-state composition formed by removal of water from an aqueous solution or slurry of a product formed in water from

(I) a halogen source which is (i) bromine, (ii) bromine chloride, (iii) a mixture of bromine chloride and bromine, (iv) bromine and chlorine in a  $\text{Br}_2$  to  $\text{Cl}_2$  molar ratio of at least about 1, or (v) bromine chloride, bromine, and chlorine in proportions such

that the total  $\text{Br}_2$  to  $\text{Cl}_2$  molar ratio is at least about 1; and  
(II) a source of overbased sulfamate which is (i) an alkali metal salt of sulfamic acid and/or sulfamic acid, and (ii) an alkali metal base,  
wherein said aqueous solution or slurry has a pH of at least 7, and an atom ratio of nitrogen to active bromine from (I) and (II) of greater than 0.93.

14. A process according to Claim 1 wherein all of the well fluid used in a given operation is treated with said breaker so that said breaker is continuously provided to the well.

15. A process according to Claim 1 wherein individual batches of well fluids are periodically treated with said breaker so that said breaker is provided intermittently to the well.

16. A process according to Claim 1 wherein the amount of said breaker used provides in the range of about 1 to about 10,000 ppm of active bromine species in the blended well fluid prior to well application.

17. A process as in Claim 1 wherein said fracturing fluid comprises a gel-type fracturing fluid.

18. A process as in Claim 17 wherein said fracturing fluid comprises a xanthan gum or a guar gum.

19. A process as in Claim 3 wherein said fracturing fluid comprises a gel-type fracturing fluid.

20. A process as in Claim 19 wherein said fracturing fluid comprises a xanthan gum or a guar gum.

21. A process according to Claim 3 wherein said halogen source is (i) bromine chloride, (ii) bromine and chlorine, or a mixture of bromine chloride and bromine, wherein said alkali metal base is a sodium or potassium base, and wherein said fracturing fluid comprises a xanthan gum or a guar gum.

22. A process according to Claim 3 wherein said halogen source consists essentially of bromine chloride; wherein said alkali metal base is a sodium base; wherein said active bromine content of the breaker is at least 100,000 ppm; wherein said atom ratio of nitrogen to active bromine originating from (A) and (B) is at least about 1; wherein the pH of the breaker is at least about 12; and wherein said fracturing fluid comprises a xanthan gum or a guar gum.

23. A process according to Claim 3 wherein said halogen source consists essentially of bromine chloride, wherein the alkali metal base is sodium hydroxide, wherein the active bromine content of the breaker is at least 140,000 ppm, the above atom ratio of nitrogen to active bromine originating from (A) and (B) is at least about 1.1, the pH of the breaker is at least about 13; and wherein said fracturing fluid comprises a xanthan gum or a guar gum.

24. A composition which comprises a sulfamate stabilized, bromine-based breaker for use in decreasing the viscosity of an aqueous polysaccharide fracturing fluid for use in subterranean oil and gas wells.

25. A composition as in Claim 24 wherein said breaker is formed from bromine chloride, bromine and chlorine, or a mixture of bromine chloride and up to about 50 mole% of bromine.

26. A composition as in Claim 24 wherein said breaker is formed from  
(A) a halogen source which is (i) bromine chloride, (ii) bromine and chlorine, (iii) bromine, or (iv) a mixture of any two or more of (i), (ii), and (iii),

- (B) a source of sulfamate anions,
- (C) alkali metal base, and
- (D) water,

in amounts such that the breaker has an active bromine content of at least 50,000 ppm, and an atom ratio of nitrogen to active bromine originating from (A) and (B) that is greater than about 0.93.

27. A composition as in Claim 26 wherein said alkali metal base is a sodium or potassium base.

28. A composition as in Claim 26 wherein said halogen source is bromine chloride, bromine and chlorine, or a mixture of bromine chloride and bromine, and wherein said alkali metal base is a sodium or potassium base.

29. A composition as in Claim 26 wherein said halogen source consists essentially of bromine chloride.

30. A composition as in Claim 26 wherein said alkali metal base is a sodium base.

31. A composition as in Claim 26 wherein said active bromine content of the breaker is at least 100,000 ppm.

32. A composition as in Claim 26 wherein said atom ratio of nitrogen to active bromine originating from (A) and (B) is at least about 1.

33. A composition as in Claim 26 wherein the pH of the breaker is at least about 12.

34. A composition as in Claim 26 wherein said halogen source consists essentially of bromine chloride; wherein said alkali metal base is a sodium base; wherein said active

bromine content of the breaker is at least 100,000 ppm; wherein said atom ratio of nitrogen to active bromine originating from (A) and (B) is at least about 1; and wherein the pH of the breaker is at least about 12.

35. A composition as in Claim 26 wherein said halogen source consists essentially of bromine chloride, wherein the alkali metal base is sodium hydroxide, wherein the active bromine content of the breaker is at least 140,000 ppm, the above atom ratio of nitrogen to active bromine originating from (A) and (B) is at least about 1.1, and the pH of the breaker is at least about 13.

36. A composition as in Claim 24 wherein said breaker is a solid-state composition formed by removal of water from an aqueous solution or slurry of a product formed in water from

- (I) a halogen source which is (i) bromine, (ii) bromine chloride, (iii) a mixture of bromine chloride and bromine, (iv) bromine and chlorine in a  $\text{Br}_2$  to  $\text{Cl}_2$  molar ratio of at least about 1, or (v) bromine chloride, bromine, and chlorine in proportions such that the total  $\text{Br}_2$  to  $\text{Cl}_2$  molar ratio is at least about 1; and
- (II) a source of overbased sulfamate which is (i) an alkali metal salt of sulfamic acid and/or sulfamic acid, and (ii) an alkali metal base,

wherein said aqueous solution or slurry has a pH of at least 7, and an atom ratio of nitrogen to active bromine from (I) and (II) of greater than 0.93.

37. A process according to Claim 1 wherein the amount of said breaker used provides in the range of about 100 to about 2000 ppm of active bromine species in the blended well fluid prior to well application.